

Rocky intertidal monitoring partnerships aid management at Cabrillo National Monument

By Bonnie J. Becker

CABRILLO NATIONAL MONUMENT (California) administers a small (120-acre, 49-ha) but very well-protected tidepool area adjacent to the mouth of San Diego Bay. The educational, recreational, and spiritual opportunities afforded by this place are directly dependent on the park's ability to effectively manage marine resources, which in turn depends on access to accurate information on the state of those resources. For 13 years park staff and an army of volunteers have been monitoring 13 key marine species that serve as indicators of the ecological condition of this rocky shoreline. In 2003 the interpretive power of the monitoring data has been greatly strengthened through partnerships, allowing park staff to draw conclusions about the success of management in the park and the region.

This monitoring program, in addition to a number of similar programs in the region, was adapted from techniques used at Channel Islands National Park. In 1997 these programs joined to form MARINE, the MultiAgency Rocky Intertidal Network, an association of 23 academic, private, federal, and local agencies (www.marine.gov), representing 57 sites in six California counties. MARINE is administered by the Minerals Management Service and is dedicated to standardizing the techniques used to monitor the rocky shoreline of southern California and compiling the resulting data. In 2003, MARINE completed the onerous task of forming a centralized database, allowing the first regional view of intertidal systems.

Through this partnership, data collected at Cabrillo can be put into a larger context. Park staff has been documenting the sizes of the

giant owl limpet, a primitive snail related to the valued and threatened abalone. Dr. Jack Engle (University of California [UC] Santa Barbara) is monitoring limpets at four MARINE sites, 2 to 20 miles (3.2 to 32 km) north of Cabrillo, with funding from the U.S. Navy. Limpets at these sites are minimally protected from harvesting. Harvesting as a food item leads to removal of the largest individuals from the population. This difference is reflected in the data: the average Cabrillo limpet was more than 40% bigger than at the nearby sites.

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In 2003, Dr. Kaustav Roy (UC San Diego), Engle, and park staff published a study demonstrating that this effect is widespread (*Ecology Letters* [2003] 6:205–211). Four species of snails, including the owl limpet, are significantly larger at Cabrillo than at any other site in the Southern California Bight. Museum samples and living specimens from the area were measured, revealing that the current snails are much smaller than samples collected before 1960, when the human population was much lower. However, Cabrillo snails are the same size as or larger than they were before 1960, and are much larger than in the years after 1960. Larger individuals are usually much more fecund

One of 13 marine species monitored at Cabrillo National Monument, giant owl limpets (page 51) are significantly larger in the park's protected tidepools than in nearby areas that are minimally protected. Research findings published in 2003 link the larger size of several marine organisms in park tidepools, a resource enjoyed and appreciated by local and visiting tourists alike, to the park's protection strategies.



than smaller ones. Additionally, selectively removing large limpets leads to a gender imbalance; all are born males that become females as they grow. Both of these circumstances lead to decreased reproduction.

For many people a visit to Cabrillo represents one of the few interactions they will ever have with marine life, and the quality of that experience is related to the condition of the resource. The Cabrillo tidepools are well-known for their quality and are preferred by both locals and visiting tourists over nearby tidepools where harvesting is allowed or limitations are not enforced. Visitation to the park is extremely high; up to 384 visitors have been counted in a single hour.

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The poaching impacts of visitation are limited by park management strategies, including the presence of education and enforcement volunteers. A Tidepool Protection, Education, and Restoration Program was established whereby volunteers explain the natural components of tidepools, how to enjoy them without harming them, and ongoing research programs.

As a result of research findings, a no-access area was established in 1996 that serves to protect existing populations as a source of organisms to adjacent areas and as an undisturbed control for many studies. Two visitor surveys were conducted by an outdoor recreation policy class at San Diego State University in 1997 and 2001. These indicated strong support (99%) by the public, who “approve of closing part of the tidepools to allow it to recover.”



Giant owl limpet, Cabrillo National Monument

Although Cabrillo National Monument administers only a small part of the southern California coastline, it plays an important role for its wildlife, visitors, and the region. It is an enclave of protection for limpets and many other invertebrates from the rapid pace of urbanization in the region. The offspring of the protected Cabrillo populations will spill over park boundaries through ocean currents to enhance other populations in the region. The park’s approaches and policies help ensure that the tidepools of Cabrillo will continue to provide protection to the resource, increased marine populations in the region, and meaningful visitor experiences for future generations. ■

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Dr. David Cole a pioneer in the field of recreation ecology research



David Cole, a research biologist stationed at the Aldo Leopold Wilderness Research Institute in Missoula, Montana, has received the 2002 Director’s Award for Natural Resources Research. He is employed by the USDA Forest Service but his research in recreation ecology transcends agency boundaries and is particularly important to National Park Service managers because it provides them with a framework for dealing with recre-

ational carrying capacity issues. Dave brings a scientific mindset to the problem of balancing visitor use with minimal damage to the environment and emphasizes the importance of formally defining problems and setting quantifiable objectives. One of his major research efforts is to understand the relationship between amount of use and amount of impact in different ecosystems. His studies indicate that in many situations “relatively low levels of use cause near-maximum impact, so as use increases, impact does not increase very much.” This has major implications, for example, for the appropriateness of campsite policies. Furthermore, he has shown that where low levels of use have caused impact, existing impacts are often extremely slow to recover even if use is greatly reduced.

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Through publications, presentations, and workshops David has assisted wilderness managers in developing policy in light of scientific research. His contribution to the Leave No Trace program was to refine practices by basing them on such research. For example, visitors had been urged not to walk in meadows because meadow was thought to be more fragile than forest. Dave’s research found that although damage to meadows is more unsightly than impacts in the forest, meadows are actually more resistant than forest ecologies.

Dave started out as a geographer. His dissertation was about wilderness vegetation and he decided to focus on the impact of humans on wilderness. He says, “Nobody else had made a career of that subject, so that’s given me lots of opportunities.” ■